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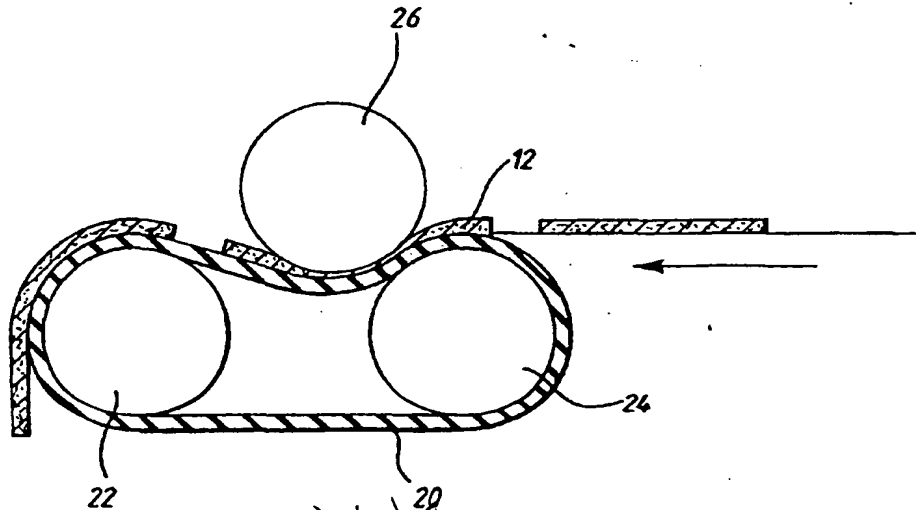
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(54) Title: IMPARTING STRETCH TO FABRICS



(57) Abstract

A method of treating a woven fabric includes applying heat and pressure to the fabric (12) in such a manner that the yarn strands substantially "across" the width of the fabric are forced closer together thus imparting generally semi-permanent or permanent "ease" or "stretch" into the fabric. Apparatus for carrying out this process is also disclosed, as well as a waistband construction utilising the treated fabric.

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### IMPARTING STRETCH TO FABRICS

The present invention relates to a process for treating fabric and to a fabric construction system, particularly though not exclusively, for application in clothing manufacture, which enables a certain degree and type of stretch to be imparted into, for example, a waistband, which hitherto has not been achieved.

Conventionally, waistband interlining can be elasticated and the outer fabric of the waistband "ruched" or "gathered", providing for a large degree of stretch whilst compromising the "tailored" look and fit of the garment to which such an elasticated waistband is attached; or comprises a "non-stretch" interlining which acts as a stiffener stabilising the outer fabric, affording some degree of reinforcement and perhaps providing added resilience.

The disadvantage of the latter system of construction is that there is little "give" or "ease" in that area of the garment incorporating the waistband, and the fit of the garment may become uncomfortable to the wearer, for example after meals when the waist expands; in prolonged wear the top of the waistband can be forced to "give way" and effectively "roll over" rendering the look of the garment unsightly. In addition a wearer falling mid way between sizing of "off the peg" waistbanded garments selects a garment which is either too tight or too loose in normal wear.

Relatively recently waistbands incorporating a combination of interlinings, linings and outer fabrics, although not necessarily all three components, which have inherent "give" or "ease" and provide a degree of "stretch" have been produced and sold in trousers and skirts. Waistbands incorporating "stretch" fabrics for example those containing "Lycra" or "Elastane", and/or those referred to as "weft stretch", in some cases achieve a satisfactory level of comfort.

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The present invention is therefore concerned primarily with consistently achieving "ease" and comfort using conventional "non-stretch" outer fabrics, for example those where the inherent characteristic in the length or width of the material does not have a sufficient degree of "ease" or "stretch" to enable a "stretch" waistband to be produced with conventional methods. Some examples of such fabrics include woven or knitted combinations of polyester/wool, polyester/viscose, cotton etc.

According to a first aspect of the present invention there is provided a method of treating a woven fabric, the method including applying heat and pressure to the fabric in such a manner that the yarn strands substantially "across" the width of the fabric are forced closer together thus imparting generally semi-permanent or permanent "ease" or "stretch" into the fabric.

It is intended that the fabric so treated would be an outer fabric, but the process can also be applied to lining or interlining fabrics.

The fabric treated may be in full width form, but typically the fabric (e.g. an outer fabric) is cut into strips either down the length of the piece (i.e. in the "warp" direction - where continuous strips may be used) or at right angles across the piece (i.e. in the "weft" direction). This provides the "classic" tailored look in the finished waistband. If it is desired to achieve a higher degree of "stretch" the fabric may be cut at a predetermined angle to the warp or weft direction which will create additional "ease" in the strip dependent on the angle of "bias" selected, but will compromise the traditional look and would be unacceptable in fabrics with a check pattern for example.

Naturally, if the strips are cut at right angles across the piece (i.e. in the "weft" direction), the reference made herein

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to the strands substantially "across" the width of the fabric should be interpreted as meaning the strands substantially "across" the width of the strip.

The strips may be discrete strips or may be continuous strips or reels of fabric, the latter option permitting higher process efficiency to be achieved although this is not always practical from a design viewpoint or necessarily cost effective in cloth utilisation terms.

Typically the outer fabric strip, having had imparted thereto generally semi-permanent or permanent "ease" or "stretch" in accordance with the method of the present invention, has affixed thereto, for example by fusing with adhesive, a selected interlining and/or interlining combination which has the inherent "stretch" required. Interlining selections could include "elastic" types where the degree of "stretch" is known as well as the recovery performance during prolonged wear.

The interlining/s may be woven, woven biased; knitted; non-woven; web adhesives or any other suitable material which, when fused, will maintain the stretch and recovery properties imparted to the outer fabric during the treatment of the present invention. In some cases the treatment stage is sufficient in itself to enable "stretch" to be imparted and retained without the need for interlining attachment in the construction.

Where an interlining is affixed to the treated outer fabric, the fused strip may optionally be further processed, for example it may be fed through an overlock machine to eventually provide for a "curtain" finish or be sewn to a pre-formed stretch/bias lining or "lining composite".

A "lining composite" may be manufactured according to the present invention by subjecting a "non-stretch" lining fabric, for example woven polyester/cotton to the heat and pressure

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treatment specified as being in accordance with the first aspect of the invention, whereby stretch is imparted to the lining fabric. A suitable interlining fabric is fused to the pretreated lining fabric, the interlining fabric being such that, when fused, it will maintain the stretch and recovery properties of the lining fabric imparted by the treatment of the present invention. This provides a "lining composite" which has the desired "stretch" characteristic - this process has the advantage of avoiding "bias" sewing costs involved in conventional "lining composite" production and enables a wider range of fabrics to be utilised in the lining of trousers or skirts. Typically the lining fabric would be in the form of a continuous reel, to provide a continuous "lining composite".

The method of the present invention may conveniently be carried out by machine, and according to the second aspect of the present invention there is provided fabric treatment apparatus comprising means for applying heat and pressure to a woven fabric and transport means for effecting relative movement between said heat and pressure application means and said fabric whereby passage of the fabric through the apparatus results in the yarn strands substantially "across" the width of the fabric being forced closer together thus imparting semi-permanent or permanent "ease" or "stretch" into the fabric.

The apparatus preferably includes means for handling continuous reels of fabric (if used). In the case of continuous reels an operator would be required to load the reels, whereas with individual strips an operator is required to locate each individual strip in a similar type operation to the placement of strips in a conventional waistband fusing operation.

Typically, the apparatus comprises a rubberised conveyor belt in close proximity to a heated steel roller, the strip passing along the belt and being "nipped" under the roller where both pressure and heat is applied progressively to the whole of the length of the strip or reel as the fabric progresses through



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the apparatus.

Preferably, the settings for the temperature and pressure of the steel roller, and the speed of the rubberised conveyor belt are pre-selected for one particular run or series of runs, but some or all of these settings can be variable dependant upon the degree of "stretch" required and the nature or composition of the material being processed. The apparatus preferably includes means for optional steaming, water mist or similar "damping" of the fabric prior to the "nip" to aid the process.

During the process the yarn strands disposed at right angles to the direction of the rubber conveyor or at least substantially "across" the width of the strip are forced closer together. The extent to which the "closing up" occurs for example may be dependant upon machine settings, hygral conditions, inherent thermal yarn shrinkage, the "set" of the fabric, etc.

On exiting from this apparatus the fabric strip has been treated in such a way as to impart generally semi-permanent or permanent "ease" or "stretch" into the fabric.

Where the apparatus is used to treat strips of outer fabric or lining fabric, the apparatus preferably encompasses means for fusing interlining/s to the treated fabric. This may be either "in line" with the main apparatus or integral therewith, or alternatively the treated strip may be fused with interlining/s by passage through a conventional waistband fusing system.

According to a third aspect of the present invention there is provided a woven fabric having "ease" or "stretch" imparted thereto by the method of the first aspect of the present invention.

According to a fourth aspect of the present invention there is provided a waistband incorporating outer fabric and/or lining fabric and/or interlining fabric treated in accordance with the

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first aspect of the present invention.

Whilst the fabric or fabric composite produced in accordance with the present invention having "stretch" potential is primarily intended to be incorporated in a waistband around the waists of garments such as trousers or skirts, the product could also be utilised for any other part of a garment where its benefits would be advantageous, for example to provide "ease" around cuffs, pocket mouths, trouser bottoms, sleeve heads etc. It could also have wider applications to textile articles other than garments, where "stiffening" or reinforcing with a certain degree of "stretch" is required.

Many other applications are also envisaged, for example tapes produced for seam sealing in, for example, the manufacture of waterproof outergarments. Conventionally, tapes for this purpose have to be cut on the bias in order to have sufficient stretch, whereas using a tape made from fabric treated according to the present invention has "stretch" or "ease" built in and therefore removes the need for biasing.

Embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:-

Figure 1 illustrates the preparation of outer fabric strips,

Figure 2 is a schematic drawing of the machine process,

Figure 3 illustrates strands drawing closer together,

Figure 4 illustrates interlining/s being fused to the strips,

Figures 5 & 6 illustrate respectively the construction of

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a "lined waistband" and its attachment to a garment,

Figures 7 & 8 illustrate respectively the construction of a "cloth waistband" and its attachment to a garment, and

Figure 9 illustrates the bottom of the outer fabric "composite" being overlapped to eventually provide a "curtain finish".

Referring to Figure 1 an outer fabric 10 is cut into strips 12, 14 either across the fabric (12) or down the length of the fabric (14). Alternatively, in Figure 1A, a continuous strip or reel 16 is cut down the length of the fabric, from the roll 18. The fabric may alternatively be treated in the full width form.

As can be seen in Figure 2, the apparatus according to the invention comprises a rubberised conveyor belt 20 driven by conveyor rollers 22, 24, and a heated roller 26 which is held against the belt 20 in closed proximity to roller 24, so as to apply heat and pressure to a fabric strip 12 passing through the nip formed between rollers 26 and 24. The strips are placed onto the conveyor by the operator - the fabric strip direction being at right angles to the heated roller. The strip is progressed through the nip of the roller and rubberised conveyor.

The result of this treatment is to force the strands which pass substantially across the width of the strip to draw closer together, as shown in Figure 3 (Figure 3(i) is before treatment, Figure 3(ii) is after treatment).

As shown in Figure 4, fusible interlining 28 is introduced and fused to the treated outer fabric strips 12 - this operation can be performed "in-line" with the apparatus shown in Figure 2, using a hot air applicator 34 which directs hot air into the nip between two rollers 32, 30. The result is a strip 12A

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which comprises a treated outer fabric strip 12 fused with interlining 28. One particularly suitable fusible interlining is reference number 010 LC from Lainiere de Picardie. Alternatively, a conventional waistband fusing system can be utilised to carry out this step.

Referring to Figure 5, a lined waistband may be created when the outer fabric fused composite 36 at least part of which has been treated according to the present invention and comprising an outer fabric 36A, a fusible carrier 36B and a stiffener 36C is sewn along sewing line 40 to a lining or "lining composite" 42 comprising a lining fabric 42A and a fusible interlining 42B (the lining composite is generally supplied in a continuous reel form to the clothing manufacturer). The "outer fabric fused composite" 36 may then be folded along the edge of the stiffener 36C or along slots provided in the carrier thereby setting the lining or "lining composite" back from the edge of the made up waistband, as illustrated in Figure 6. The assembly is then stitched together along sewing lines 44, 46.

Referring to Figures 7 & 8, a "cloth waistband" may be created by folding the outer fabric fused composite 36, at least one of the components of which has been treated in accordance with the present invention, in half, either along the edge of the stiffener (if one has been used) or by folding along the slots in the fusible interlining (if provided); the unfinished edges are folded under and attached to the outer and inner sides of the garment as shown in Figure 8, being secured along sewing lines 48, 50.

Optionally, the "outer fabric fused composite" 36 can be overlocked along one edge 52 by an overlock sewing machine as shown in Figure 9, to provide a "curtain finish" to the cloth waistband 54.

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CLAIMS

1. A method of treating a woven fabric, the method including applying heat and pressure to the fabric in such a manner that the yarn strands substantially "across" the width of the fabric are forced closer together thus imparting generally semi-permanent or permanent "ease" or "stretch" into the fabric.
2. A method according to Claim 1 wherein the fabric to be treated is cut into strips either down the length of the piece or at right angles across the piece.
3. A method according to Claim 2 wherein the strips are either discrete strips or continuous strips or reels of fabric.
4. A method according to any of the preceding Claims wherein the fabric is an outer fabric which, having had imparted thereto generally semi-permanent or permanent "ease" or "stretch" in accordance with the Claim 1, has affixed thereto, for example by fusing with adhesive, a selected interlining and/or interlining combination which has the inherent "stretch" required.
5. A method according to Claim 4 wherein the interlining is selected from "elastic" types of interlining.
6. A method according to Claim 4 or Claim 5 wherein the fused strip is further processed by feeding through and overlock machine.
7. A method according to Claim 4 or Claim 5 wherein the fused strip is further processed by being sewn to a pre-formed stretch/bias lining or "lining composite".
8. A method according to Claim 7 wherein the "lining composite" is manufactured by subjecting a "non-stretch" lining fabric to the heat and pressure treatment according to Claim 1

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whereby stretch is imparted to the lining fabric, and then fusing this to a suitable interlining fabric, which, when fused, will maintain the stretch and recovery properties of the lining fabric imparted during the treatment according to Claim 1, thus providing a "lining composite" which has the desired "stretch" characteristic.

9. Fabric treatment apparatus comprising means for applying heat and pressure to a woven fabric and transport means for effecting relative movement between said heat and pressure application means and said fabric whereby passage of the fabric through the apparatus results in the yarn strands substantially "across" the width of the fabric being forced closer together thus imparting semi-permanent or permanent "ease" or "stretch" into the fabric.

10 Apparatus according to Claim 9 wherein the apparatus includes means for handling continuous reels of fabric.

11. Apparatus according to Claim 9 or Claim 10 wherein the apparatus comprises a rubberised conveyor belt in close proximity to a heated steel roller, the strip passing along the belt and being "nipped" under the roller where both pressure and heat is applied progressively to the whole of the length of the strip or reel as the fabric progresses through the apparatus.

12. Apparatus according to Claim 11 wherein the settings for the temperature and pressure of the steel roller, and the speed of the rubberised conveyor belt are pre-selected for one particular run or series of runs, but some or all of these settings can be variable dependant upon the degree of "stretch" required and the nature or composition of the material being processed.

13. Apparatus according to any of Claims 9 to 12 wherein the apparatus includes means for optional steaming, water mist or

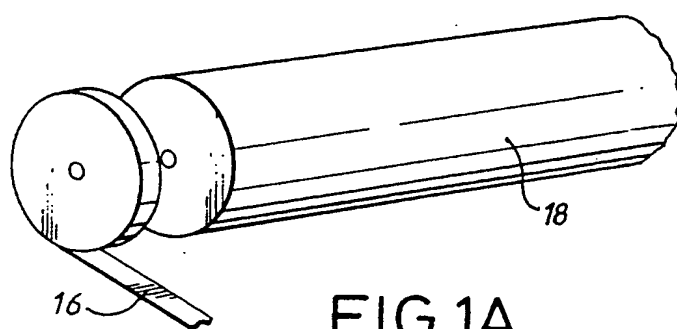
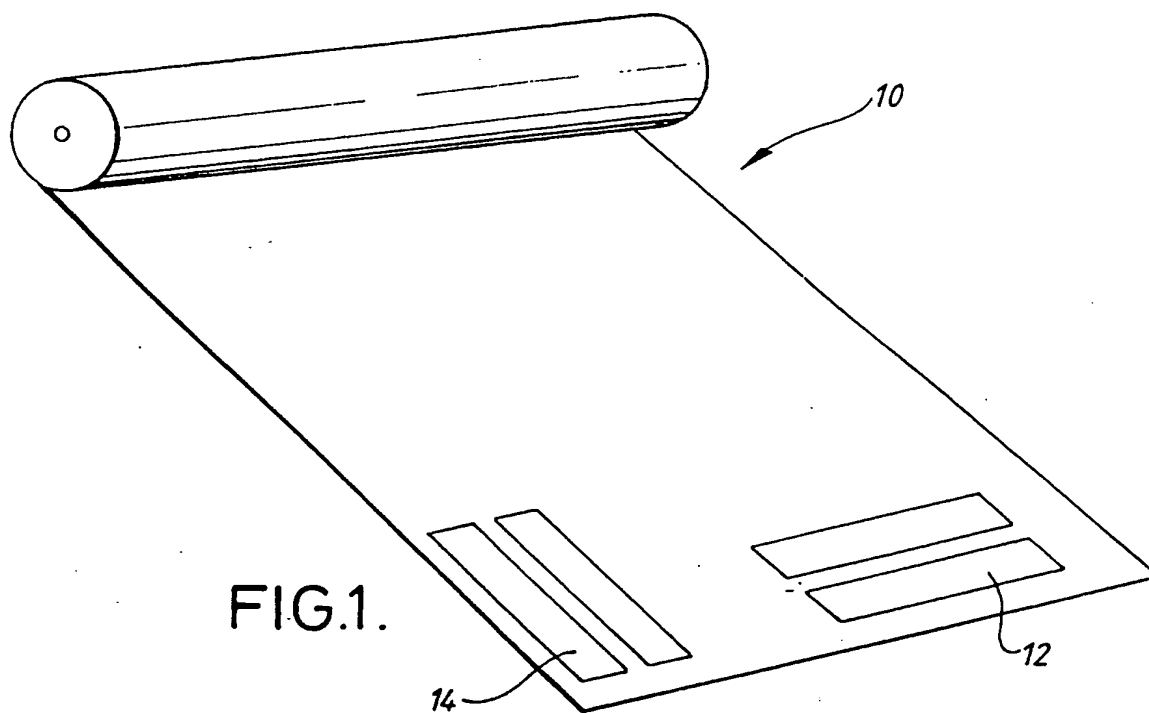
-11-

similar "damping" of the fabric prior to the "nip" to aid the process.

14. A woven fabric having "ease" or "stretch" imparted thereto by the method of Claim 1.

15. A waistband incorporating outer fabric and/or lining fabric and/or interlining fabric treated in accordance with the method of Claim 1.

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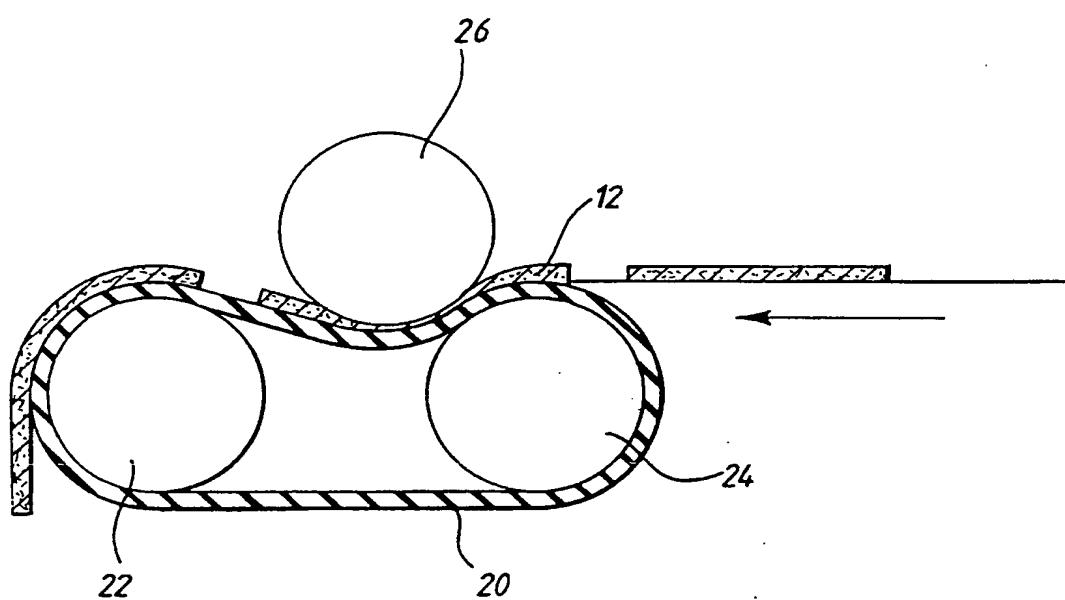
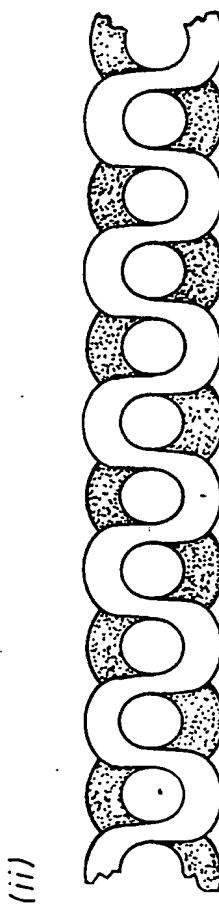
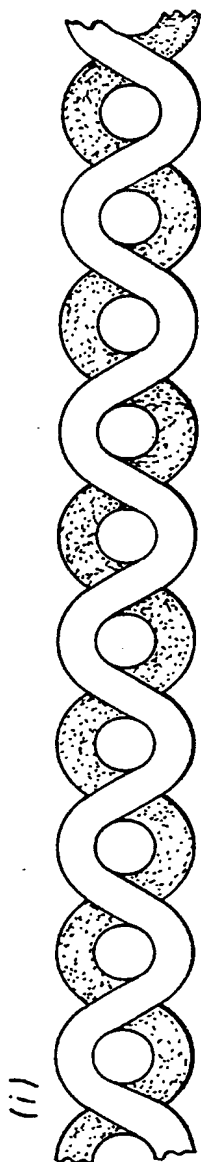


FIG.2.

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FIG. 3.



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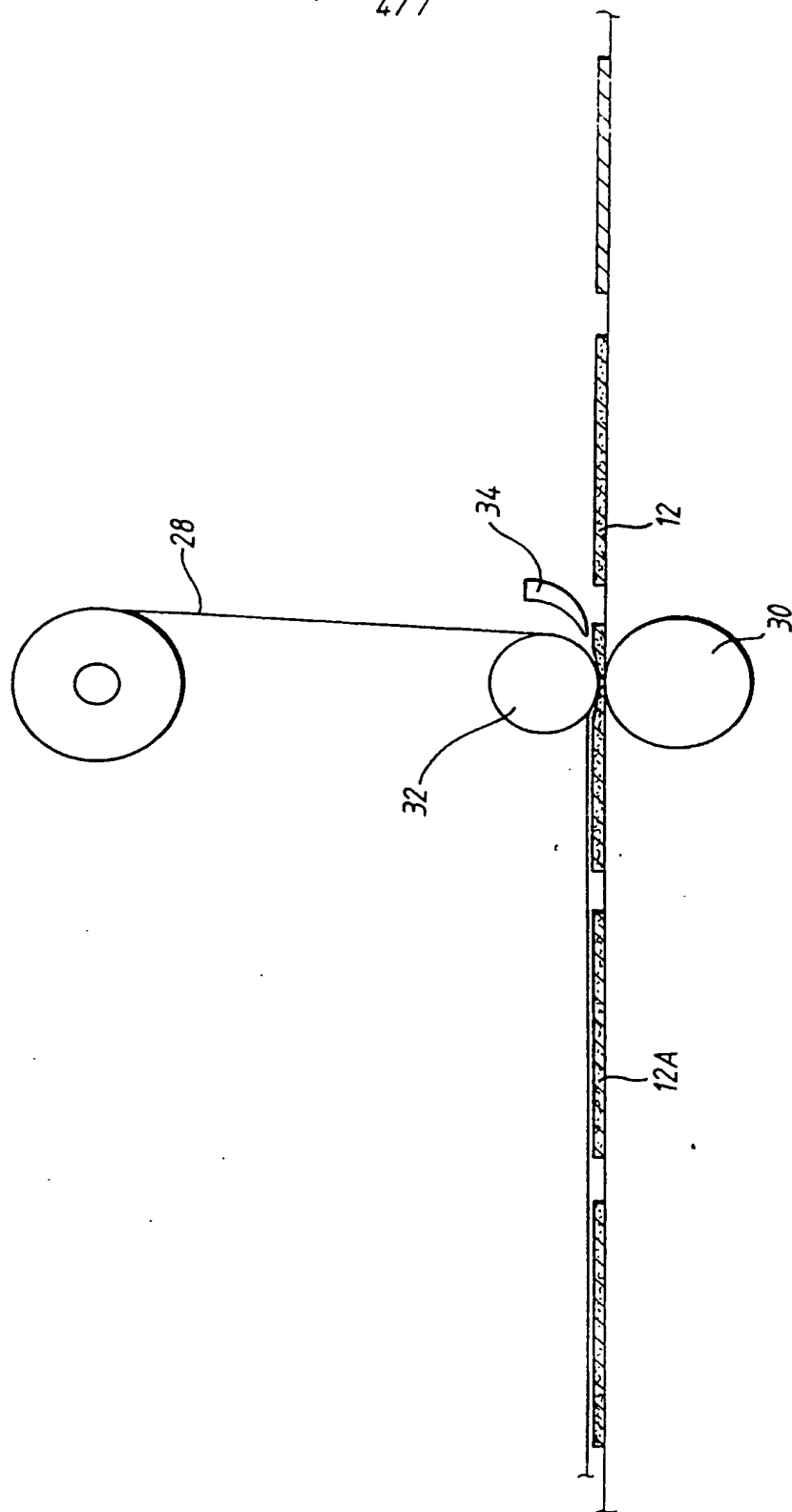


FIG. 4.

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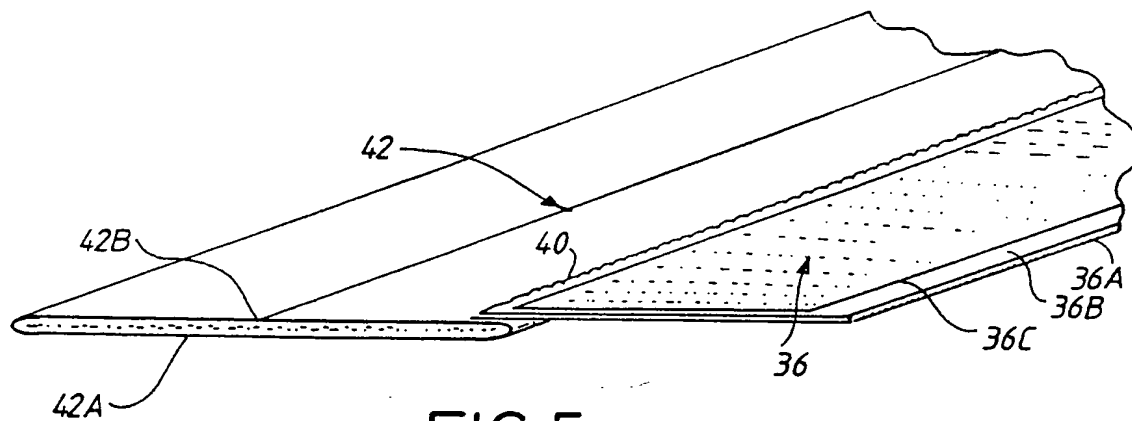


FIG. 5.

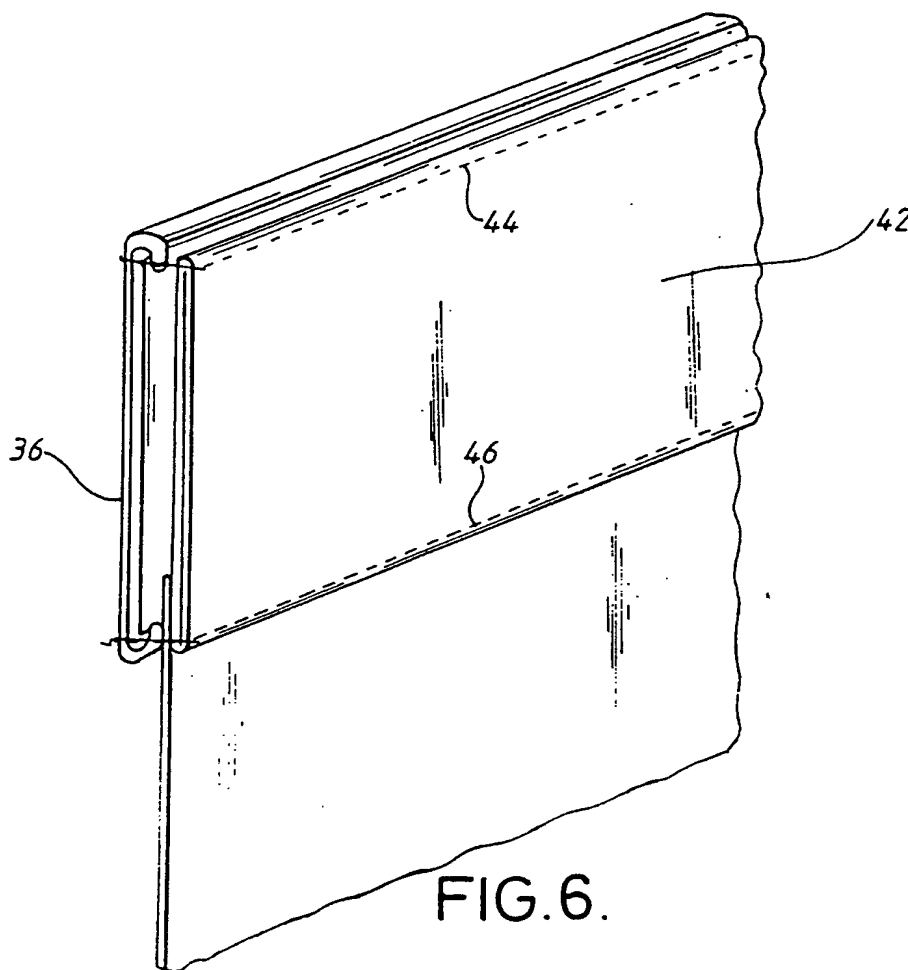


FIG. 6.

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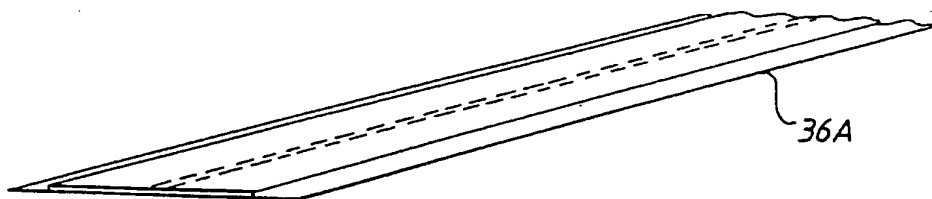


FIG. 7.

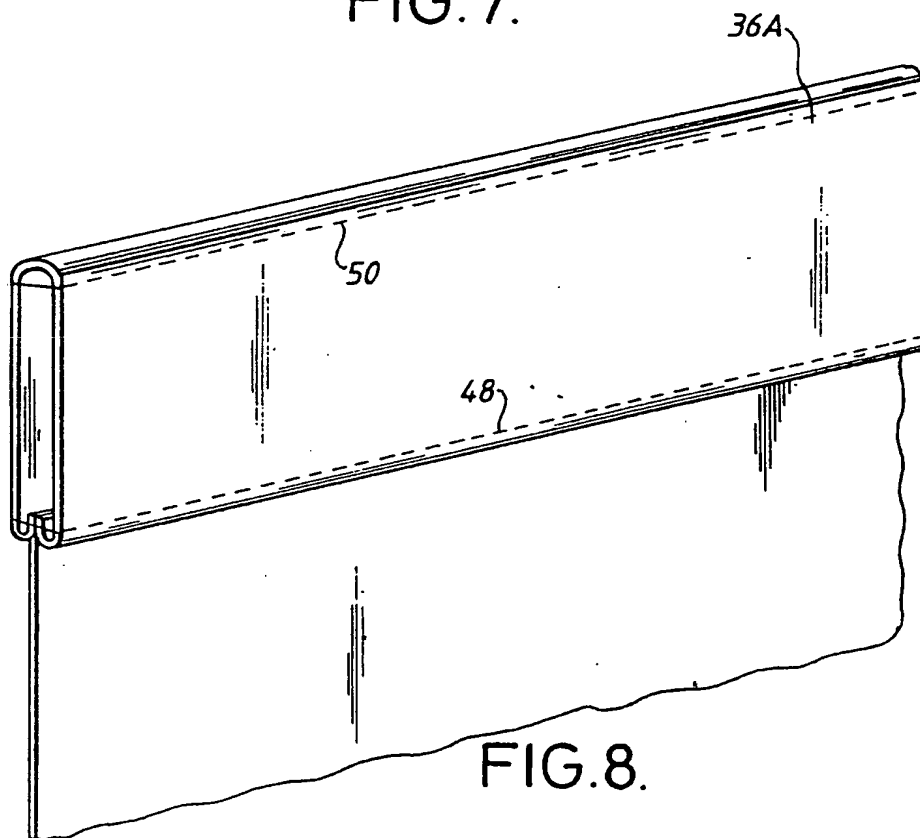
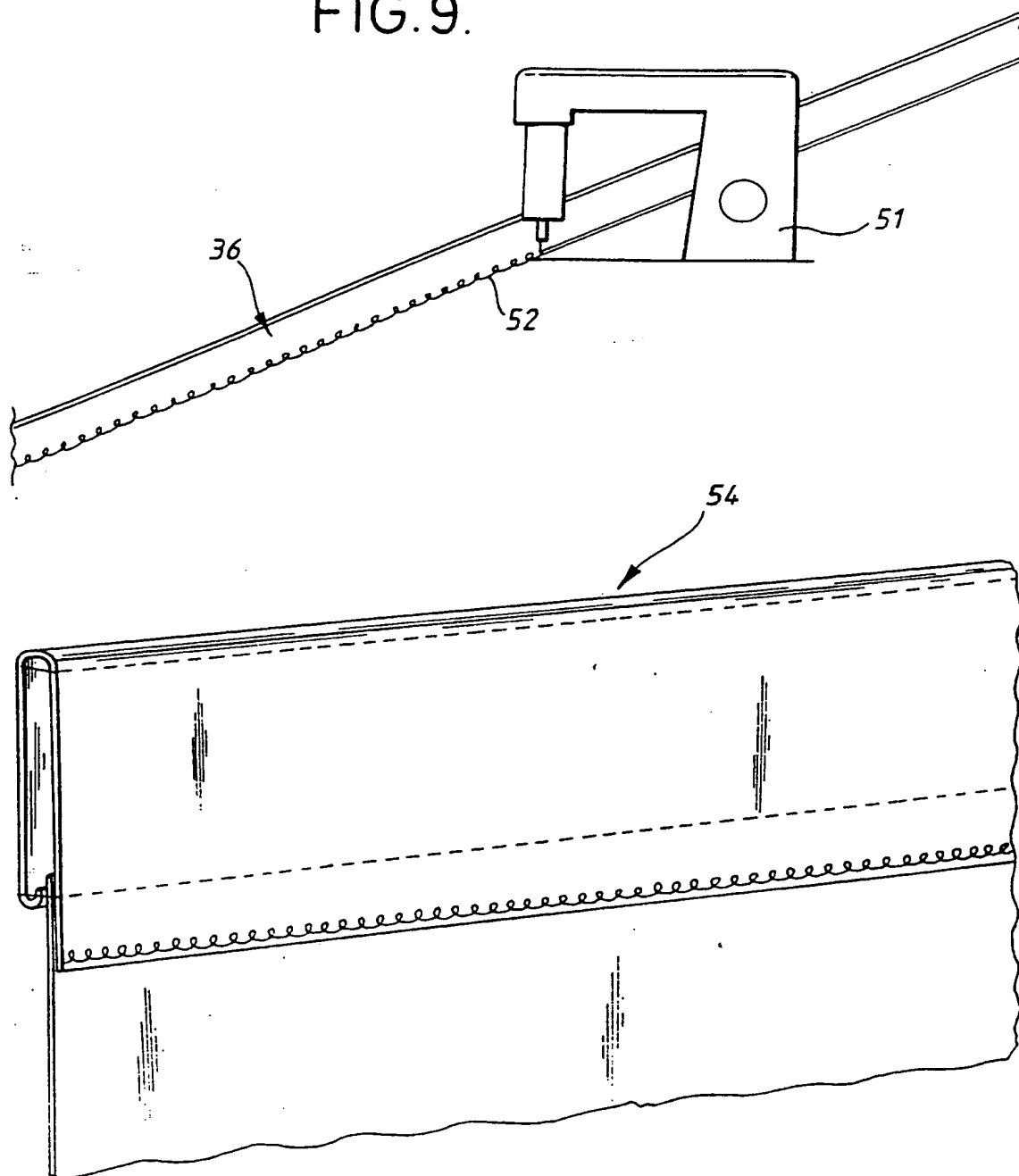


FIG. 8.

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FIG. 9.



## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/GB 94/01079

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 5 D06C21/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 5 D06C A41F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US,A,4 051 215 (TSURUTA ET AL) 27 September 1977 see column 2, line 24 - column 3, line 32; figure 1 ----	1,9-12, 14
A	DE,A,24 44 923 (DAY'S, INC.) 8 April 1976 see claims 1-4; figures 1-16 ----	1,4,5
A	US,A,3 382 552 (DAVIS ET AL) 14 May 1968 ----	
A	US,A,3 504 712 (DUSENBURY ET AL) 7 April 1970 ----	
A	US,A,3 723 993 (RUBY) 3 April 1973 -----	

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Date of the actual completion of the international search

15 September 1994

Date of mailing of the international search report

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information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-4051215	27-09-77	NONE	
DE-A-2444923	08-04-76	NONE	
US-A-3382552		NONE	
US-A-3504712	07-04-70	BE-A- 672789	16-03-66
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		LU-A- 49916	24-01-66
		NL-A- 6515260	25-05-66
		US-A- 3336644	
		US-A- 3409960	
US-A-3723993	03-04-73	NONE	